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ABSTRACT

A total of 33 kindergarten children and 33 third grade students were shown videotapes of children in commonly distressing situations, in order to elicit affective and cognitive responses. The children indicated how the stories made them feel (empathy), why the story characters felt as they did (perspective taking), their desire for the characters to feel better, and knowledge of appropriate ways to help. In contrast to previous research, variables were treated as categorical. Data were analyzed using discrete multivariate analyses of several types, and results were compared to a regression analysis, which assumed continuous data measured on ratio scales. Contingency table analysis and ordered probit models were used, and these discrete data analyses produced results somewhat different from the regression analysis. Affective variables were found to be related, cognitive variables were found to be related, and desire to help was strongly related to appropriateness of suggested help. (Author/RH)

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A COMPARISON OF DISCRETE AND CONTINUOUS MULTIVARIATE ANALYSES OF CHILDREN'S REACTIONS TO VIEWING OTHERS IN DISTRESS

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Abstract

Thirty-three kindergarteners and thirty-three third graders were shown videotapes of children in commonly occurring distressing situations, in order to elicit affective and cognitive responses. The children indicated how the stories made them feel (empathy), why the story characters felt as they did (perspective-taking), their desire for the characters to feel better, and knowledge of appropriate ways to help. The data were analyzed using discrete multivariate analyses of several types, and the results were compared to a regression analysis, which assumed continuous data measured on ratio scales. Contingency table analysis and ordered probit models were used, and these discrete data analyses produced results somewhat different from the regression analysis.

A COMPARISON OF DISCRETE AND CONTINUOUS MULTIVARIATE ANALYSES OF CHILDREN'S REACTIONS TO VIEWING OTHERS IN DISTRESS

Much work has attempted to specify the relationships among empathy, perspective-taking, and prosocial behavior, particularly in the context of children's understanding of and reactions to viewing other people in distress. Each of these concepts has been measured in a variety of ways. Feshbach and Roe (1968) were among the earliest researchers to distinguish "empathy," the emotional reaction to seeing another child in distress, from "perspective-taking,"[1] the cognitive understanding of how another child feels and the circumstances accounting for it. They showed 6- and 7-year-olds narrated slide sequences about children in everyday situations and asked the participants "How do you feel?" after the story. Empathy was scored as a match between what the child said and the emotion depicted by the story character. Perspective-taking was measured by asking how the characters felt. Variations on this affect-matching measure of empathy and recognition of emotions measure of perspective-taking are common and are used in this study.

Prosocial behavior has also been measured in a variety of ways. Although some researchers observe spontaneous prosocial behavior (e.g., Zahn-Waxler & Radke-Yarrow, 1982; Zahn-Waxler, Radke-Yarrow, & King, 1979), most studies use standardized measures, typically opportunities to share (e.g., Barnett, Howard, Melton, & Dino, 1982; Howard & Barnett, 1981).

Most studies using the common affect-matching measures of empathy, identification of emotions to measure perspective-taking, and standardized or spontaneous measures of prosocial behavior are based on the

rationale that children who feel sad when seeing other children in distress or who understand why another child feels sad will be more likely to help the other. A review of these studies found that results usually show positive correlations but often nonsignificant ones (Barnett, Howard, Melton, & Dino, 1982; Buckley, Siegel, & Ness, 1979; Eisenberg-Berg & Lennon, 1980; Howard & Barnett, 1981; Hudson, Forman, & Brion-Meisels, 1982; Kagan & Knudson, 1982; Smith, Leinbach, Stewart, & Blackwell, 1983; Zahn-Waxler, Radke-Yarrow, & Brady-Smith, 1977). See Radke-Yarrow, Zahn-Waxler, and Chapman (1983) and Underwood and Moore (1982) for comprehensive reviews of such studies.

Hoffman (1975; 1981; 1982) has provided the most explicit rationale for the expectation that seeing someone in distress will lead to some form of prosocial behavior. First Hoffman concludes that empathic distress motivates a person to help others, based on findings from observational studies. He then proposes a theory of how the affective, cognitive, and motivational components of empathic distress interact and lead to prosocial behaviors.

Hoffman stresses that the affective and cognitive components of empathy interact. The affective properties of empathy (arousal and motivation) are shaped by the cognitive aspect of increasing understanding of others' states.

In addition to distinguishing between a cognitive and affective component of the observer's perception, which others have done, Hoffman has also distinguished between an affective and cognitive aspect of a helping response. He proposed that a child may emotionally respond to another's distress with a desire to help, but the attempt to help

may be inappropriate due to the child's limited understanding of the situation and/or inability to take the other's perspective.

Although several studies of the type we have referenced are derived from Hoffman's theory, most provide quite indirect evidence to test his theory due to the methodology used. Typically unrelated stimuli are used in measuring empathy, perspective-taking, and behavior. Although this procedure is valid for testing the extent of the generality of an underlying concept, it does not serve to test Hoffman's theory adequately. A methodology that more accurately reflected Hoffman's model would measure both affective and cognitive aspects of children's reactions to the same situation that is distressing the other person, on which his theory is based. In addition, a full test of Hoffman's model would also measure cognitive and affective components related to prosocial behavior, appropriate helping being dependent on a cognitive understanding of the situation as well as a desire to help.

The purpose of this study is to present young children with life-like, stressful interpersonal situations involving other children and measure four responses to them. The affective response to viewing another child in distress is (1) an emotional or empathic reaction, as measured by a self-report of distress. The cognitive response is (2) an understanding of how the characters felt and why they did, referred to as accuracy of perspective-taking. In addition, an affective and cognitive aspect of an "orientation to helping" are also measured: (3) a desire to have the main character feel better, referred to as a desire to help, and (4) knowledge of what would be an effective way of making the main character feel better, measured by the appropriateness of suggestions for help.

Therefore, Hoffman's model could be more fully tested in that a distinction was made between the reaction to the situation, as measured by (1) distress and (2) perspective-taking, and the orientation to helping the person in the situation, as measured by (3) desire for affect to change and (4) knowledge of appropriate help. It is hypothesized that the two affective variables of self-reported distress and a desire for affect to change are strongly related, as are the two cognitive variables of perspective-taking and appropriateness of suggested help. Hoffman's (1981; 1982) full model is much more elaborate than is represented by these four variables, and any complete test would have to include a measure of actual behavior. However, results from this study can be judged consistent or inconsistent with Hoffman's theory.

METHOD

Subjects

The participants were 33 kindergarteners (15 boys, 18 girls) and 33 third-graders (16 boys, 17 girls) from two predominantly white, middle-class public schools. The kindergarteners' average age was approximately 5 years, and the third-graders' average age was approximately 8 years.

Procedure

Each child was told, "We're going to watch some stories on television about boys and girls doing different things, and then we'll talk about them." They individually watched a set of 12 unrelated episodes displayed by a color videocassette. Six "happy stories" showed child actors experiencing positive affect while engaged in pleasant everyday

activities, such as playing with friends, eating ice cream, and surprising mother with a birthday cake. The six "sad stories" each focused on a major character who was involved in a typical stressful interpersonal situation that involved being scolded by a parent, being excluded from playing with peers, or having an argument with a peer.

Each story lasted approximately one minute and consisted of speech and action accompanied by a narrative story.[2]

The six sad stories were mixed with the six happy stories. Two sets of six stories each were used, and the order of presentation of those two sets was counterbalanced across participants within each age group. Although the sad stories were the stimuli of primary interest, the happy stories were included as a contrast to check that the sad stories did actually make the participants feel sad, relative to the happy stories.

Measures

The following measures were taken after viewing each sad story. (Only the self-report was measured after the happy stories.)

Self-report (SR). This measure was designed to assess the children's emotional reaction to the stories. After each one, the child was asked "How did the story make you feel at the end?" The child pointed to one of five schematic faces on a cardboard strip that ranged from very happy to neutral to very sad in expressions (Buck, 1975). Scores ranged from 1 (very happy) to 5 (very sad). This measure is more appropriate than the affect-matching ones, because distress is measured on an intensity dimension rather than as an all or none response.

Perspective-taking (PT). These four questions, used by Rothenberg (1970), were intended to measure the accuracy of the child's knowledge of how the characters in the story felt and why they felt that way.

After each story, the child was asked the following:

PT1 How did (the main character) feel at the end of the story?

PT2 Why did (he, she) feel (use child's words)?

PT3 How did (supporting characters) feel at the end of the story?

PT4 Why did (he, she, they) feel (use child's words)?

PT1, PT2, and PT4 were scored on the basis of accuracy and completeness on a scale of 0, 1, or 2. PT3 was scored 0 or 1, because the story did not provide sufficient information for more gradations of accuracy.

For each child the self-report question was asked first on three stories, and the perspective-taking questions were asked first on the other three.

Desire to Help (DH). This question was intended to measure the affective aspect of the orientation to helping the main character. The desire to help was defined as the child's desire to see the main character, who felt bad at the end of the story, feel better.

The child was asked "Would you like (the main character) to feel the same way or different from the way (he, she) felt at the end of the story? This was followed by "How would you like (him, her) to feel?" to verify what the child meant, given possible misunderstanding of "same" and "different." Note that DH asks only for what the children would like to see happen, regardless of what they would actually do

if witnessing a real occurrence of the situation. Therefore, DH is an affective part of the orientation to helping.

Appropriateness of Suggested Help (ASH). The cognitive aspect of the child's orientation to help was defined as knowledge of what would make the main character feel better (i.e., suggesting appropriate ways of making the character feel happy). The experimenter asked, "Let's pretend I wanted to make (the main character) feel happy at the end of the story. What could I do to make (him, her) feel happy, if I were there?" The child was encouraged to give as many suggestions as possible. Note that ASH asks only for what could be done, regardless of the child's willingness or ability to act. Therefore, ASH is a cognitive part of the orientation to helping. "Help" could also be called "prosocial behavior" and includes anything that would make the character feel better.

ASH was scored on a scale of 0 to 2, based on how directly the suggestion was derived from the particular situation and how well it pointed to what bothered the main character. For example, one sad story showed two girls bouncing a ball back and forth. Then one girl kept the ball without bouncing it back, despite the other's protests. ASH answers would be scored 0 for "I don't know," 1 for "give her a toy," and 2 for "let her play with the ball."

The order of the DH and ASH questions was alternated. Because the self-report and perspective-taking questions always came first, four orders of questions were possible, and these were varied from story to story in order to avoid response sets.

RESULTS

Reliability

Interrater reliability was calculated for the 4 perspective-taking questions, the desire to help, and appropriateness of suggested help questions for 22 randomly selected participants (11 K and 11 3rd graders). The ratio of the number of agreements between the two raters to the total number of questions was .95.

Table 1 shows the distribution of the variables. The frequencies were obtained by multiplying 66 subjects by 6 stories, totaling 396 observations. The distributions of the scores on the six happy stories and six sad stories are significantly different (χ^2 of 596.5 with 4 d.f.). A measure of discordance, γ (see Davis (1967)), is based on pairs of observations in the sample which differ in both characteristics, differences being in the same direction (concordant) or different directions (discordant). Here, letting happy = 1 and sad = 2, there are 138,153 concordant and 5564 discordant pairs: $\gamma = 0.9226$, a very high association, indicating that the children did report feeling sadder after watching the sad stories as opposed to the happy ones.

Insert Table 1 about here

Analysis Plan and Hypotheses

Sibulkin (1979) reports the means and variances of the variables, the simple correlations among them, and two regressions, with DH and ASH as the dependent variables. Those analyses treated the variables as continuous. This paper treats these variables as categorical and uses log-linear and order probit models to test Hoffman's hypotheses.

Viewed as categorical data, the variables in this study have no means or variances. Only their distributions are meaningful. In place of simple correlations there are many measures appropriate to categorical data, and in some cases the measures designed for ordered categorical data may be used. The size of the data set limits the number of variables which may be included in the analysis. If the data can be collapsed partially or totally along the dimensions of story, sex, and age, the situation improves. Therefore the possibility of collapsing the data is investigated.

It can be argued that using six observations from each child is improper, because they cannot be a random sample, inasmuch as the unmeasured attributes of the child are constant. In principle the dimension of child number (1 to 66) should be taken into account. In the present study this would prevent any results at all from being obtained. In addition, the unmeasured characteristics are unlikely to be known in general in settings where knowledge of the interaction of cognitive and affective aspects of the development of children would be helpful. If the relationship between these cognitive and affective matters is invariant to these other factors, the sample used here sheds undistorted light on the relationship. (Collapsing the data on the child dimension is nonbiasing.) This is assumed to be true.

The following four hypotheses were identified, where PT generally refers to the four variables PT1, PT2, PT3 and PT4.

1. The desire to help (DH) and the appropriateness of suggested help (ASH) will be weakly related.
2. The self-report of distress (SRS) and the accuracy of perspective-taking (PT) will be weakly related.

3. The self-report of distress (SRS) will be substantially related to the desire to help (DH).
4. The accuracy of perspective-taking (PT) will be substantially related to the appropriateness of suggested help (ASH).

These hypotheses follow from DH and SRS representing affective responses and PT and ASH representing cognitive responses.

All of these hypotheses are to be interpreted as conditional on sex, grade, stories, and their interactions, so a prior question is whether these variables have significant effects on the affective and cognitive ones.

Measures of Association

In this section, we compare measures of association derived from continuous and discrete interpretations of the data. The only statistics which will be reported are the goodness of fit χ^2 (GFX^2), the likelihood ratio χ^2 (LRX^2), and the Pearson product moment correlation coefficient (r). The chi-square statistics are sufficient to evaluate association for most purposes, and the r statistics are measures of association of continuous variables. All the relevant statistics are presented in Table 2.

Insert Table 2 about here

There are eleven variables, but SRH may be associated meaningfully only with sex (X), grade (G), and story (N). (Story refers to the happy stories in this case.) Thus of 55 possible pairs, 48 are useful

for analyses. Of these, 38 can be analyzed in aggregate form, with all observations added across the stories.

The 38 comparable values of r are found for data aggregated by stories in column 6 and disaggregated in column 9 of Table 2. Of these 38, two are of equal size and 36 are smaller in absolute value for the disaggregated data. One pair, S-P3, changes sign. The two equal pairs are a pair of perfectly independent variables (Grade - PT3), and a double-dummy pair (sex-grade) which is fixed by design. There are 396 observations forming the disaggregated r, and thus a smaller r may be more statistically significant. In particular, the equivalent t-values shown in column 7 are derived from the r as $t = \sqrt{(T-2)r^2/(1-r^2)}$ where T is the sample size. Of the 38 comparable R^2 values, 34 are more statistically significant in the disaggregated data, and four are less. These four are the pairs P1-P2, P1-DH, P1-ASH, and P3-DH. In these cases, especially P1-P2, the aggregation may have induced an apparent association; these variables are the coded answers to "How did the main character feel?" and "Why?" The correlation between the answers to these questions is important. Perhaps the background music in the films (see footnote 2) eliminated the necessary link between understanding how and why. The fact that the P3-P4 pair did not behave the same way suggests a difference hidden by the aggregation.

Turning to the χ^2 statistics, of the 48 pairs analyzed, 23 have a larger GFX^2, 20 have a larger LRX^2, and five are tied. LRX^2 and GFX^2 necessarily have the same limiting distributions only if the model to which they are attached (here, independence of the two variables being associated) is true (Bishop, Feinberg, & Holland, p. 513). Certainly, independence is not frequently an accurate assumption. Neverthe-

less, the values are usually close. See columns 2 and 3 of Table 2. Because of its relevance to log-linear models, LRX^2 is used here as the basis for significance tests and the levels shown in column 5 of Table 2.

Comparing the levels of significance in columns 5 and 8, the qualitative chi-square attains greater statistical significance 27 times, a lesser statistical significance four times and an equal level seven times, all cases of significance at $\alpha < 0.0001$. The four cases where the aggregated correlation coefficient attains greater statistical significance are S-P3, already noted as the only case where the disaggregated and aggregated correlation coefficients have opposite signs, S-P4, P1-P3, and P3-DH. The table P1-P3 is one of those for which the disaggregated and aggregated correlation coefficients differ greatly.

The greater significance levels found in the associations among the disaggregated data suggest that the six stories for each child may induce association from child-specific attributes, or the different stories may induce the increased association, or both may be at work.

Collapsing Sex, Grade, and Stories, and Fitting Some Log-Linear Models

The objective in modeling probabilities π is to estimate a function $f(\theta)$ which determines π. The model used almost exclusively here is the log-linear model, $\ln\pi_i = X\beta + \varepsilon$. Basic to the model is the assumption of multinomial sampling overall or within fixed margins, such as the sex-grade-story margin here.

All models are evaluated via the likelihood ratio test. No parameters or standard errors are presented. Aside from the facts that kindergarten boys had rather low scores on all variables, the only interesting

observation about direction concerns the three fold classification of stories. See Table 3, the implications of which hold up disaggregated by age and sex, except that third graders sometimes all scored near the maximum. The parental stories are generally more difficult except in PT1. The poor scores on argument stories result from misidentifying a child's anger as sadness. Children may have particular difficulty comprehending the angry emotions in the parent stories. This could result from the inherent difficulty young children have in recognizing adult anger, or the threatening nature of the stories.

Insert Table 3 about here

It would be helpful to be able to collapse demographic variables along the cognitive and affective ones. This is improper if any partial correlations are altered in the process. Assuming that sex, age, and stories are logically and causally prior to the other variables, and noting that there are too many categories to test all possible correlations, the testing is confined to fitting log-linear models to the data with sex, age, stories, and every other variable in turn.

Age is not expected to be independent of the cognitive and affective variables, although sex might be (Hoffman, 1977). Stories should be investigated with regard to partially collapsing them into the three groups of parents, rejections, and arguments.

In fitting any log-linear model to the data, the sex-grade-story margin must be included because these margins were fixed in taking the sample. What is to be tested is the hypothetical independence of any or all of the other variables from the sex-grade-story combinations. The sex-grade-story margin takes up 24 degrees of freedom.

Thus the χ^2 tests are made by fitting the model [(ABC), (D)] where A = sex, B = grade, C = story, and D = one of eight variables. Table 4 shows the results.

Insert Table 4 about here

The hypothesis is rejected, except in the case of SRH. Table 5 shows the results of testing the hypothesis that only the three-fold classification of stories is required for the residual to be insignificant. The model is [(ABC), (C*D)], where C* refers to the stories in the parent-rejection-argument breakdown and D refers to the "other" variable in the analysis.

Insert Table 5 about here

The effect of the three types of stories is significant at the 5% level for all but DH (where the effect is significant at the 10% level) and SRS. Only PT1, PT3 and DH are independent of other effects, and for DH the other effects are significant at the 10% level.

The principle source of this failure of independence is the poor scores attained by kindergarten boys. In the log-linear model the inclusion of the ABD margin forces the inclusion of the AD and BD effects. This is not the case in an ordered probit model, considered in a later section. The final models fitted here are of the form [(ABC), (ABD), (C*D)] for PT2, PT4, DH and ASH. For SRS, the model [(ABC), (ABD)] is fitted inasmuch as the three-fold story classification does not have a significant effect. See Table 6.

Insert Table 6 about here

The models to be fitted for PT2, PT4, DH, and ASH, are all [(ABC), (ABD), (C*D)].

The values of residual LRX^2 resulting from this model are:

Variable	LRX^2	Degrees of Freedom
DH	15.39	18
PT2	89.43	36
PT4	34.38	36
ASH	32.99	36

The model is adequate for all but PT2, whose LRX^2 remains significant. To investigate where the significant deviation from the model is arising, the residuals are examined; 29 have positive and 43 have negative residuals. The distribution of these deviations is virtually uniform across the sex-grade categories, but not across stories. The number of positive deviations by story-PT2 combination is as follows:

Story	PT2=0	PT2=1	PT2=2
1	0	3	1
2	1	4	1
3	0	1	3
4	1	0	3
5	2	2	0
6	4	0	3

Apparently the three-fold classification of stories is distorting in this case; observe that the pairs of stories about parents (#1,#6), rejection (#2,#4), and arguments (#3,#5) have inverse error distribu-

tions. The partitioned LRX^2 for PT2, including the entire (CD) marginal, is in Table 7. The remaining effects are nonsignificant.

Insert Table 7 about here

SRH is independent of demographic variables; SRS is independent of stories; PT1 and PT3 depend only on stories by type; PT4, DH and ASH depend on sex, age, and stories by type; and PT2 depends on sex, age, and stories. These results may be translated into observations about the children. Responding to happy stories (SRH) is not affected by sex and age. Responding to sad stories (SRS) is not based on the type of story. Detecting how the main and supporting characters feel (PT1 and PT3) depend on the type of situation concerned; situations involving parents are associated with lower scores. The other cognitive variables (PT4, ASH, PT2) refer to why characters felt as they did and what would alleviate the problem, and these variables require relatively complicated models to explain.

Testing the Hypotheses Using Log-linear Models

Log-linear models are well-suited to testing hypotheses of independence. All the effects in the models may be represented as sets of dummy variables. The effect of all the rows together is zero because the total sample size or total probability is not affected by the rows. Similarly the sum of all column effects is zero. Higher-order interaction effects represent the difference between lower-order effects. For example, the sex-grade-PT2 interaction estimates the differences between the responses of PT2 to grade in various sexes. Other equivalent definitions can be made in terms of the other variables. The LRX^2

can be partitioned exactly, and the GFX^2 can be partitioned approximately, for any model with direct estimates. When only indirect estimates exist, the resulting assignment of chi-square to various effects may differ (Bishop, Feinberg & Holland, 1975).

As in other statistical activities, it is necessary to control for factors affecting more than one of the variables whose association is to be evaluated, to avoid biased results. The hypotheses are restated here in terms of variables:

1. DH and ASH are weakly related.
2. SRS and the PT's are weakly related.
3. DH and SRS are strongly related.
4. ASH and the PT's are strongly related.

The interactions of these variables with age, grade and stories are ignored here. For hypotheses 1 and 3, there is no omitted variable bias in omitting variables uncorrelated with any included variable. The second reason is that it is infeasible for hypotheses 2 and 4, which will be tested ignoring the effects of sex, grade, and stories. Table 8 records the results.

Insert Table 8 about here

The results of the tests are that DH and ASH are strongly associated and that DH and SRS are somewhat associated. These confirm one conclusion of Sibulkin. She found in the data aggregated across stories that DH and SRS "were only weakly related" (p. 61) and that DH significantly helped to explain ASH (p. 47). The relationship between DH and SRS, the two affective variables, was the principal surprise.

Sibulkin suggests this may have resulted from the lack of variation in DH (31 zeroes and 365 ones). The aggregation apparently eliminated much of what appears here to be a significant relationship. In any case the relationship between DH and ASH appears to be stronger, however.

Ordered Probit Models

The log-linear models are somewhat disappointing in that in two cases we cannot actually control for age, grade, and sex, even though we should do so, because of insufficient numbers of degrees of freedom. An ordered probit model offers a different approach, neither contained by nor contained in the log-linear model. The ordered probit model works as follows: a scale (Y) such as appropriateness of suggested help (ASH) is construed to be the discrete visible manifestation of an underlying latent variable (Y*). Then Y and Y* are related as follows:

$$Y = 0 \text{ if } -\infty < Y^* \leq \ell_0$$
$$Y = 1 \text{ if } \ell_0 < Y^* \leq \ell_1$$
$$Y = 2 \text{ if } \ell_1 < Y^* \leq \ell_2$$
$$\vdots$$
$$Y = L \text{ if } \ell_L < Y^* < \infty.$$

In this case, there are assumed to be L+1 values observed (there are three values of ASH). One can then let Y* be a function of other factors in the usual fashion of linear or nonlinear models. In this case, ASH is a function of various values of DH (desire to help), PT (perspective-taking) variables, and sex, grade, and story. The explanatory variables are entered as dummy variables so that they are treated as

categorical, not as measuring ratios. For example, PT1 = 3 is just different from PT1 = 2, not 1.5 times it.

Table 9 reports some of the results of the estimation undertaken to test the hypotheses in this paper. Coefficients refer to effects on the underlying scale and are not, therefore, of importance per se. The results are as follows. Perspective-taking has little effect, and not systematically positive or negative, on self-report. This is as predicted. Desire to help (DH) strongly affects ASH, which is unexpected but reconfirmed yet again. Self-report is consistently related to DH, especially in one way. Children who respond quite inappropriately (SRS=1, happy) to the sad stories fail to desire to help. This is a more precise indication of the relationship than we had before; with the log-linear model a relationship is present but its nature was not so clearly specified. Note that the coefficients tend to increase as SRS increases. (SRS=5 has a coefficient of 0.0 by design.) Perspective-taking is related significantly to ASH only via PT2, which makes sense because PT2 is "Why does the main character feel ..." To prescribe for the main characters, one must understand their problems; it is the most directly relevant measure.

Insert Table 9 about here

We also examine the relationship of perspective taking to desire to help as another measure of the interaction of affective and cognitive variables. As in the case of DH and ASH, a significant relationship is found. PT1 predicts higher DH. PT1 is "How did the main character feel?" To want to help, the child had to understand how the main charac-

ter felt (PT1 > 0). These results support the conclusion that to make the help effective, the child had to understand why (PT2 > 0).

The results of the ordered probit models are consistent with those of the log-linear analysis. Affective variables are related, cognitive variables are related, and desire to help is strongly related to appropriateness of suggested help. To be effective, the child must want to help and understand the specific problem.

DISCUSSION

A data set obtained in a previous study of children viewing other children in distress, and analyzed previously in aggregated form using techniques appropriate for continuous data, was analyzed in disaggregated form using techniques appropriate for categorical data. Despite the differences in methodology, the conclusions are quite similar. The affective variables of "self-report, sad" (how did the story make you feel?") and "desire to help" the suffering protagonist are relatively weakly related, while desire to help and appropriateness of suggested help are strongly related. Perspective-taking measures were strongly related to the appropriateness of suggested help and weakly related to "self-report, sad". Thus, the understanding of the situation is different from the emotional response to it.

Various measures of association were demonstrated. The effects of disaggregation were to decrease the Pearson correlation coefficient but to increase its statistical difference from zero, in most cases. In a few cases apparent aggregate associations disappeared in the disaggregated data.

Types of stories frequently have strong effects, particularly when the threefold typology is used, parent stories being harder to understand than rejection stories or argument stories.

The discrete multivariate analysis indicates that the desire to help requires an understanding of the situation and tends to encourage appropriate suggestions to be made. Hoffman's (1975; 1981, 1982) theory is generally supported, to the extent it was tested here.

NOTES

[1]"Perspective-taking" is equivalent to what other researchers have called "affective role-taking."

[2]It was intended that children's emotional reactions should not be completely dependent on understanding everything about the characters and events. The stories used here provided much information about the affective state of the characters through visual cues of facial expressions and auditory cues of music and narration. Pretesting did reveal, however, that children often answered questions about these stories inaccurately. This indicated that the questions were of sufficient difficulty for obtaining a range of scores.

TABLE 1

DISTRIBUTION OF THE DATA

	Value	Frequency
Sex:	Female (0)	210
	Male (1)	186
Grade:	Kindergarten (0)	198
	Third Grade (1)	198
Story Identifier No. (Sad):	#2 (1)	66
	#4 (2)	66
	#5 (3)	66
	#8 (4)	66
	#10 (5)	66
	#11 (6)	66
Story Identifier No. (Sad):	#2 or #11, parent (1)	132
	#4 or #8, rejection (2)	132
	#5 or #10, argument (3)	132
Story Identifier No. (Happy):	#1 (1)	66
	#3 (2)	66
	#6 (3)	66
	#7 (4)	66
	#9 (5)	66
	#11 (6)	66
PT1:	0	9
	1	102
	2	285

TABLE 1 (continued)

	Value	Frequency
PT2:	0	39
	1	44
	2	313
PT3:	0	36
	1	360
PT4:	0	84
	1	80
	2	232
DH:	0	31
	1	365
ASH:	0	56
	1	90
	2	250
SRH:	very happy (1)	281
	somewhat happy (2)	75
	neutral (3)	28
	somewhat sad (4)	7
	very sad (5)	5
SRS:	very happy (1)	27
	somewhat happy (2)	17
	neutral (3)	97
	somewhat sad (4)	123
	very sad (5)	132

TABLE 2

COMPARISON OF SIMPLE CORRELATIONS FROM SIBULKIN'S AGGREGATED DATA

AND CHI-SQUARED STATISTICS FROM DISAGGREGATED TWO-DIMENSIONAL TABLES

Variables are coded thus:

X - Sex
G - Grade
N - Story
P1 - PT1
P2 - PT2
P3 - PT3
P4 - PT4
SRH - SRH
S - SRS
DH - DH
ASH - ASH

Other Abbreviations:

GFX^2 - Goodness of fit X^2
LRX^2 - Likelihood ratio X^2
df - Degrees of freedom
NA - Not available

					r (simple correlation coefficients)			
				Significance		Equivalent	Significance	
Table	GFX^2	LRX^2	d.f.	Level[1]	Aggregated	t	Level[2]	Disaggregated
X*SRH	8.773	9.177	4	0.0568	+0.147	1.189	0.5	+0.077
G*SRH	15.032	19.688	4	0.0006	-0.157	1.269	0.5	-0.082
N*SHR	27.886	29.639	20	0.0759	N.A.	N.A.	N.A.	-0.129
X*G	0.365	0.365	1	0.5457	+0.030	0.243	>0.8	+0.030
X*N	0.000	0.000	5	1.0000	N.A.	N.A.	N.A.	0.000
X*S	9.252	9.376	4	0.0524	-0.197	1.609	0.2	-0.134
X*P1	3.086	3.099	2	0.2123	-0.148	1.195	0.5	-0.086
X*P2	6.792	6.858	2	0.0324	-0.234	1.925	0.1	-0.108
X*P3	0.536	0.535	1	0.4645	-0.091	0.728	0.5	-0.037
X*P4	15.141	15.297	2	0.0005	-0.209	1.707	0.1	-0.122
X*DH	0.291	0.290	1	0.5899	-0.040	0.317	0.8	-0.027
X*ASH	24.179	25.029	2	0.0001	-0.237	1.951	0.1	-0.174

TABLE 2 (continued)

					r (simple correlation coefficients)			
Table	GF^2	LRX^2	d.f.	Significance Level[1]	Aggregated	Equivalent t	Significance Level[2]	Disaggregated
G*N	0.000	0.000	5	1.000	N.A.	N.A.	N.A.	0.000
G*S	34.605	38.511	4	0.0001	+0.194	1.583	0.2	+0.132
G*P1	8.913	9.674	2	0.0079	+0.239	1.970	0.1	+0.140
G*P2	21.300	23.195	2	0.0001	+0.392	3.410	0.002	+0.181
G*P3	0.000	0.000	1	1.000	0.000	0.000	1.0	0.000
G*P4	23.482	24.035	2	0.0001	+0.416	3.662	0.001	+0.243
G*DH	12.634	13.052	1	0.0002	+0.261	2.161	0.05	+0.179
G*ASH	62.090	65.304	2	0.0001	+0.527	4.964	0.0001	+0.387
N*S	21.431	23.204	20	0.2789	N.A.	N.A.	N.A.	-0.013
N*P1	148.427	150.579	10	0.0001	N.A.	N.A.	N.A.	-0.146
N*P2	77.692	68.958	10	0.0001	N.A.	N.A.	N.A.	-0.035
N*P3	22.367	21.246	5	0.0007	N.A.	N.A.	N.A.	-0.036
N*P4	64.579	63.135	10	0.0001	N.A.	N.A.	N.A.	+0.038
N*DH	8.154	8.754	5	0.1193	N.A.	N.A.	N.A.	-0.063
N*ASH	73.520	74.189	10	0.0001	N.A.	N.A.	N.A.	-0.010
S*P1	10.399	13.304	8	0.1018	-0.063	0.502	0.8	-0.023
S*P2	12.465	11.987	8	0.1518	+0.114	0.317	0.8	+0.049
S*P3	2.112	2.040	4	0.7284	-0.151	1.220	0.5	+0.044
S*P4	12.012	11.634	8	0.1683	+0.215	1.758	0.1	+0.092
S*DH	11.931	9.974	4	0.0409	+0.203	1.658	0.2	+0.145
S*ASH	43.593	33.966	8	0.0001	+0.391	3.409	0.002	+0.151

TABLE 2 (continued)

Table	GFX^2	LRX^2	d.f.	Significance Level[1]	r (simple correlation coefficients) Aggregated	Equivalent t	Significance Level[2]	Disaggregated
P1*P2	43.991	30.704	4	0.0001	+0.400	3.488	0.001	0.000
P1*P3	6.822	4.507	2	0.1050	+0.397	3.459	0.002	+0.088
P1*P4	33.834	29.336	4	0.0001	+0.391	3.401	0.002	+0.134
P1*DH	10.410	7.547	2	0.0230	+0.121	0.975	0.5	+0.011
P1*ASH	11.601	10.360	4	0.0348	+0.254	2.100	0.005	+0.005
P2*P3	2.977	2.912	2	0.2332	+0.042	0.337	0.8	+0.040
P2*P4	59.915	48.028	4	0.0001	+0.572	5.581	0.0001	+0.309
P2*DH	1.722	1.526	2	0.4663	+0.152	1.231	0.5	+0.065
P2*ASH	60.892	62.871	4	0.0001	+0.619	6.301	0.0001	+0.355
P3*P4	57.179	48.102	2	0.0001	+0.463	4.176	0.0001	+0.362
P3*DH	0.014	0.014	1	0.9066	+0.041	0.328	0.8	+0.006
P3*ASH	1.919	1.852	2	0.3962	+0.059	0.475	0.8	+0.056
P4*DH	2.527	2.478	2	0.2897	+0.206	1.680	0.1	+0.076
P4*ASH	40.435	36.647	4	0.0001	+0.540	5.138	0.0001	+0.288
DH*ASH	23.591	18.795	2	0.0001	+0.457	4.108	0.001	+0.234

NOTES: (1) Based on the Likelihood Ratio Chi-Square

(2) Significance levels for t-values are derived for 60 degrees of freedom (the correct value is 64 in every case) and for the following levels of a two-tailed test: α = 1.0, 0.8, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, 0.0001.

TABLE 3

CROSS-TABULATIONS OF THREE GROUPS OF STORIES

WITH OTHER VARIABLES

Stories of	Parents	Rejection	Arguments
SRS = 1	8	11	8
2	6	6	5
3	29	25	43
4	38	48	37
5	51	42	39
PT1 = 0	4	3	2
1	6	13	83
2	122	116	47
PT2 = 0	28	5	6
1	22	13	9
2	82	114	117
PT3 = 0	24	5	7
1	108	127	125
PT4 = 0	47	19	18
1	14	17	49
2	71	96	65
DH = 0	16	8	7
1	116	124	125
ASH = 0	27	15	14
1	58	11	21
2	47	106	97

TABLE 4

TESTING FOR INDEPENDENCE FROM SEX, AGE, AND STORIES

Variable	$\Sigma X_{++1} \ln X_{++1}$	$\Sigma X_{ijkl} \ln X_{ijkl}$	χ^2	Degrees of Freedom
SRH	2023.159558	819.8484116	108.58	92
SRS	1817.327717	617.6547533	115.85**	92
PT1	2102.481664	936.9388698	184.11*	46
PT2	2107.944847	917.3283510	133.97*	46
PT3	2248.004133	1013.599024	46.39*	23
PT4	1986.393812	794.5943931	131.60*	46
DH	2259.916137	1020.210753	35.79*	23
ASH	2010.767795	861.2952440	216.25*	46

*significant at the .01 level.

**significant at the .05 level.

TABLE 5

TESTING FOR INDEPENDENCE FROM ALL BUT THE

THREEFOLD STORY CLASSIFICATION

Variable	$\Sigma X_{++k1} \ln X_{+++1}$	χ^2 for (ABC)(C*D)	Degrees of Freedom	χ^2 for effect (C*D)	Degrees of Freedom
SRS	1387.085316	106.24	84	9.61	8
PT1	1739.549945	39.88	42	144.24*	4
PT2	1691.673721	96.41	42	37.56*	4
PT3	1822.360020	27.57	21	18.82*	2
PT4	1576.901464	80.48	42	51.11*	4
DH	1827.288916	30.94	21	4.85**	2
ASH	1611.40111	144.89	42	71.37*	4

*significant at the 5% level.

**significant at the 10% level.

TABLE 6

MODEL TO EXPLAIN SRS

Effects	χ^2	Degrees of Freedom
(ABC), (D)	1118.46	28
(AD), (BD), (ABD)	62.22	12
Remaining Effects	53.63	80

TABLE 7

PARTITIONING THE LRX^2 OF PT2, AS A FUNCTION OF SEX, AGE, AND STORIES

Effects	LRX^2	Degrees of Freedom
(ABC), (D)	1632.43	26
(ABD), (AD), (BD)	35.88	6
(C*D)	37.56	4
(CD) - (C*D)	31.40	6
Other effects	30.13	30
Total	1834.66	72

TABLE 8

TESTS OF HYPOTHESES ASSUMING DIRECT MODELS,

COLLAPSING ALONG SEX, GRADE, AND STORIES

Hypotheses	Description	χ^2	Degrees of Freedom
1	DH-ASH (weak)	18.795	2
2	SRS-PT's (weak)	133.656	214
3	DH-SRS (strong)	9.974	4
4	ASH-PT's (strong)	136.346	106

TABLE 9

COEFFICIENTS FROM ORDERED PROBIT MODELS

TESTING THE HYPOTHESIS

Dependent Variable	Independent Variable	Coefficient	t-value
ASH	DH	0.50318	1.8983**
	PT1 = 1	0.17698	0.36601
	PT1 = 2	0.22127	0.50024
	PT2 = 1	0.35909	1.0754
	PT2 = 2	0.57589	2.0835*
	PT3 = 1	-0.30750	-1.2369
	PT4 = 1	0.27098	1.1740
	PT4 = 2	0.29710	1.5275
DH	SRS = 1	-0.13630	-2.347*
	SRS = 2	-0.027446	-0.400
	SRS = 3	-0.053430	-1.487
	SRS = 4	-0.000044	-0.001
DH	PT1 = 1	1.4018	2.2102*
	PT1 = 2	1.0161	1.8301**
	PT2 = 1	-0.46210	-0.9003
	PT2 = 2	-0.38050	-0.9522
	PT3 = 1	-0.49528	-1.0653
	PT4 = 1	-0.42541	-1.1456
	PT4 = 2	0.07588	0.2350

TABLE 9 (continued)

Dependent Variable	Independent Variable	Coefficient	t-value
SRS	PT1 = 1	0.038388	0.10025
	PT1 = 2	-0.24216	-0.68470
	PT2 = 1	-0.65372	-2.3990*
	PT2 = 2	-0.16072	-0.78498
	PT3 = 1	0.27239	-1.2689
	PT4 = 1	-0.083064	-0.43023
	PT4 = 2	0.099404	0.58610

Note: omitted categories: PT variables = 0, SRS = 5, DH = 0,
SRS = 1 is happy, SRS = 5 is sad.

*Significant at the 5% level.

**Significant at the 10% level.

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